



Study 2

Survey of Radiation Issues & Materials Development



OBJECTIVES

- Identify materials radiation issues for Exploration Missions
- Identify what is being done in response to these issues
- Recommend materials for an evaluation test plan
- Identify gaps in materials development

CONCLUSIONS

- Long duration Exploration Missions present new materials challenges
 - Different environments than LEO
 - Repairs/Replacement impracticable/cost prohibitive
 - Long life/ high reliability mandatory
- Long term effects of deep space environments on materials performance not known
- Lunar Test Bed needed to provide design data
- Radiation induced outgassing not being addressed
- Materials development needed for high priority radiation protection, thermal management, and lunar resource utilization applications

FOCUS AREAS

- Exploration Mission environments
- Materials flight heritage
- High payoff materials
 - Mission enabling/enhancement
 - Multifunctional
 - High radiation resistance potential
- CEV/CLR/Cargo vehicle applications
- In-situ resource utilization

RECOMMENDATIONS

- A. Develop following materials (CRL 3 or above)
 1. MSFC RXF1 Composite
 2. RF Aerogel Composite Insulation
 3. X Aerogel Composite Insulation
 4. Carbon-Polymer Composite
 5. Sulfur Binder for Lunar Regolith
 6. Ceramer Protective Coating
 7. Tailorable Conductive Coating
- B. Investigate radiation induced outgassing of habitable environment materials